UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ECOLOGICAL SITE DESCRIPTION

ECOLOGICAL SITE CHARACTERISTICS

Site Type: Rangeland

Site Name: Deep Sand

Site ID: R042XB011NM

Major Land Resource Area: 042 - Southern Desertic Basins, Plains, and Mountains

Physiographic Features

This site occurs on level to gently sloping old eolian and alluvial deposits. Slopes range from 1 to 9 percent and average abut 3 percent. Elevations range from about 3,800 to 5,000 feet.

Land Form:
(1) Fan
(2) Fan apron
(3) Fan remnant

	Minimum	Maximum
Elevation (feet):	3800	5000
Slope (percent):	1	9
Water Table Depth (inches):	N/A	N/A
Flooding:		
Frequency:	Very rare	Rare
Duration:	Extremely brief	Brief
Ponding:		
Depth (inches):	N/A	N/A
Frequency:	None	Rare
Duration:	Very brief	Brief
Runoff Class:	Negligible	Very low
Aspect:		

Climatic Features

Annual average precipitation ranges from 8 to 10.5 inches. Wild fluctuations from year to year are common, ranging from a low of about 2 inches to a high of over 20 inches. At least on -half of the annual precipitation comes in the form of rainfall during July, August, and September. Precipitation in the form of snow or sleet averages less than 4 inches annually.

	Minimum	Maximum
Frost-free period (days):	179	212
Freeze-free period (days):	200	233
Mean annual precipitation (inches):	8.0	10.5

Monthly precipitation (inches) and temperature (°F):

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precip. Min.	0.37	0.36	0.23	0.18	0.29	0.57	1.42	1.92	1.53	1.01	0.48	0.57
Precip. Max.	0.54	0.39	0.27	0.36	0.45	0.64	1.9	2.2	1.66	1.07	0.58	0.78
Temp. Min.	20.8	25.5	31.2	38.0	46.4	54.3	61.1	59.1	51.5	39.8	28.8	22.3
Temp. Max.	58.1	63.8	71.0	79.3	87.4	96.4	95.5	92.7	87.5	78.7	67.2	58.5

Climate Stations:
(1) NM3855, Hatch. Period of record 1961 - 1990
(2) NM8387, Socorro. Period of record 1961 - 1990

Influencing Water Features

This site is not influenced by water from wetland or stream.

Wetland Description: System Subsystem Class
(Cowardin System)

Representative Soil Features

The soils are moderately deep to deep. The surface layer is typically a sand or loamy sand overlying fine sandy loams, loamy sands to sands. They may have accumulations of calcium carbonate or indurated caliche below 20 inches. The soils are frequently calcareous throughout. They are well drained and moderately rapid to rapidly permeable with moderate water-holding capacity. Because of the sandy surface and inability to hold a large amount of water, if unprotected, wind blowing becomes severe.

Predominant Parent Materials:

Kind: Mixed-calcareous
Origin: Mixed-igneous-metamorphic & sedimentary

Surface Texture:	(1)	Loamy fine sand
	(2)	Loamy sand
	(3)	Sand
Subsurface Texture Group:	Sandy	
Surface Fragments <=3" (% Volume):		0
Surface Fragments > 3" (% Volume):		0
Subsurface Fragments <=3" (% Volume:		6
Subsurface Fragments > 3" (% Volume):		0
Drainage Class:	Well drained To Excessively drained	
Permeability Class:	Moderately slow To Rapid	

	Minimum	Maximum
Depth (inches):	24	60
Electrical Conductivity (mmhos/cm):	0	8
Sodium Absorption Ratio:	N/A	N/A
Calcium Carbonate Equivalent (percent):	N/A	N/A
Soil Reaction (1:1 Water):	7.4	8.4
Soil Reaction (0.01M CaCl2):	N/A	N/A
Available Water Capacity (inches):	2.0	5.0

Plant Communities

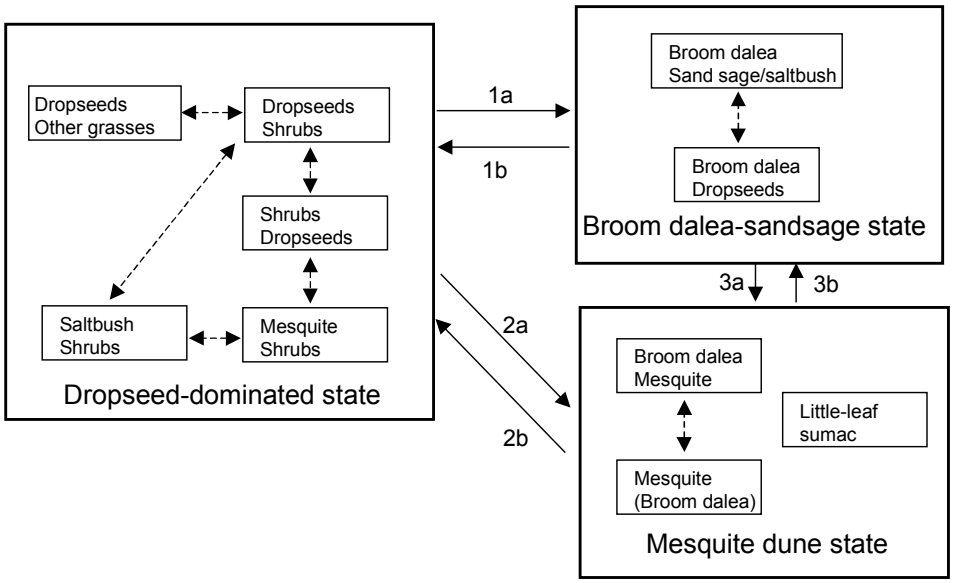
Ecological Dynamics of the Site

Overview

This site often intergrades with either the Sandy or Gravelly sand sites. Deep sand sites located on hills, known as Sandhills sites in Texas, are present in SD-2 and are included here. The soil profiles of dunes in the mesquite-dominated state in the Sandy site are similar to those of Deep sand sites, and this state and site have been equated. It is unknown, however, if mesquite coppice dunes sites could support Deep sand plant communities. They may not, due perhaps to differences in landscape position or the size of the deep sand soil patches, which are relatively small in Sandy sites. Until it is demonstrated that Sandy-derived coppice dunes can be rehabilitated as Deep sand sites (which has not yet been attempted so far as the author is aware) it is best to treat these as separate classifications. The historic plant community type of the Deep sand site is dominated by dropseeds (*Sporobolus flexuosus, S. contractus, S. cryptandrus*), especially the giant dropseed (*S. giganteus*). Black grama (*Bouteloua eriopoda*) and bush muhly (*Muhlenbergia porteri*) are also important grasses. Under heavy grazing pressure, the more palatable black grama and bush muhly decline, and eventually dropseeds decline. Shrubs that are common in the site, including sand sage (*Artemisia filifolia*) and broom dalea (*Psorothamnus scoparius*), increase in representation and cover with grazing or perhaps due to climate change. Honey mesquite (*Prosopis glandulosa*) may invade or increase. Shrub control and grazing management results in varying degrees of restoration or grass cover in some cases. In other cases, grass cover is highly reduced and broom dalea and/or sand sage persist as dominants or mesquite dunes may persist. It is not known what soil or climatic changes underlie these persistent vegetation changes.

No systematic studies of communities, states or transitions have been performed in Deep sand sites in SD-2. Because of the unique plant communities and soils of these sites, studies of soil variation among sites exhibiting different states would provide a useful contribution.

State-Transition model: MLRA 42, SD-2, sandy subgroup: Deep sand



1a. Persistent reduction of grasses, extinction of seed pool, competitive dominance by shrubs
1b. Shrub removals and possibly seed additions
2a. Soil degradation?, climate change?, mesquite seed introduction.
2b. Shrub removal and soil amendments?
3a. Mesquite invasion. 3b. Shrub removal and prevention of seed additions

MLRA 42; SD-2; Deep sand

Dropseed-dominated

•Giant dropseed, spike dropseed, soaptree yucca
•Normally has patches of open ground due to dominance of bunchgrasses, abundant litter
•Wind-driven sand trapped by grasses
•Copia sand, soils, El Paso, TX

Broom dalea-sand sage, broom dalea/dropseeds

•Giant dropseed patch in a matrix of broom dalea, saltbush, and other shrubs
•More open ground, less litter
•Sand blowouts and duning apparent
•Copia sand, Fort Bliss, MacGregor Range Camp, TX

Broom dalea-sand sage, broom-dalea/saltbush

•Broom dalea dominant, followed by saltbush and rosemarymint
•Unclear if this used to have grass
•Sand blowouts and duning apparent
•Copia sand, Fort Bliss, MacGregor Range Camp, TX

Mesquite-dominated

•Mesquite dominant left, Bluepoint loamy sand, Dona Ana Co., NM
•Little-leaf sumac dominant right, sand deposition over limestone (= sandhills type). Fort Bliss, MacGregor Range Camp, TX
•Extensive areas of bare ground, erosion apparent
•Unclear why mesquite invades in some situations

State Containing Historic Climax Plant Community

Dropseed-dominated grassland: The historic community of this site is dominated by dropseeds (dropseed/other grasses community) and features a significant cover of black grama and bush muhly. Sand sage, broom dalea, yucca (*Yucca elata*), fourwing saltbush (*Atriplex canescens*) are also common components. Dropseed abundance may fluctuate considerably with drought-wet cycles. Grazing-induced retrogression leads initially to a loss of black grama and bush muhly (dropseed/shrubs community) and eventually to a reduction in dropseeds (Shrubs/dropseed community). Honey mesquite may encroach or invade under some circumstances, although there are deep sand communities where this invasion seems to be limited. It is not known if the nutrient redistribution processes and loss of inter-shrub soil fertility observed in Sandy sites (see the Sandy model) is important in this site. It is believed that in the absence of grazing, invasion and growth of saltbush (a highly palatable shrub) may eventually lead to mesquite mortality (saltbush/shrubs community) and a return to dropseed dominance (if not a restoration of the dropseed community). There are no data to suggest a mechanism for this pattern, nor are there any rigorous documentations of the pattern. There are, however, areas on deep sand soils within the city of Las Cruces, NM, that are ungrazed and are now dominated by saltbush and large mesquite plants. Such locations may be the result of protection from grazing and saltbush proliferation. If the saltbush-succession process does occur, then mesquite-invaded communities can be considered to occur within the dropseed dominated state.

Diagnosis: Dropseed cover is dominant or substantial, black grama and bush muhly usually present and may dominate in some cases.

Ground Cover (Average Percent of Surface Area).	
Grasses & Forbs	15
Bare ground	75
Surface gravel	1
Surface cobble and stone	T
Litter (percent)	9
Litter (average depth in cm.)	1

Plant Community Annual Production (by plant type):

Annual Production (lbs/ac)

Plant Type	Low	RV	High
Grass/Grasslike	122	272	420
Forb	21	46	72
Tree/Shrub/Vine	32	70	108
Lichen			
Moss			
Microbiotic Crusts			
Totals	175	388	600

Historic Climax Plant Community Plant Species Composition: Plant species are grouped by annual production **not** by functional groups.

Group	Grass/Grasslike Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
1	spike dropseed sand dropseed mesa dropseed	*Sporobolus contractus* *Sporobolus cryptandrus* *Sporobolus flexuosus*	78	97
2	giant dropseed	*Sporobolus giganteus*	116	136
3	black grama	*Bouteloua eriopoda*	19	39
4	bush muhly	*Muhlenbergia porteri*	4	19
5	plains bristlegrass	*Setaria vulpiseta*	[4] 4	[19] 19
6	threeawn fluffgrass	*Aristida* *Dasyochloa pulchella*	[4] 4	[12] 12
7	Grass, annual		[4] 4	[13] 12

Group	Shrub/Vine Common Name	Scientific Name	Annual Production in Pounds Per Acre Low	High
8	sand sagebrush broom dalea yucca	*Artemisia filifolia* *Psorothamnus scoparius* *Yucca*	19	39
9	fourwing saltbush littleleaf sumac	*Atriplex canescens* *Rhus microphylla*	4	19
10	broom snakeweed	*Gutierrezia sarothrae*	4	19
11	Morman-tea pricklypear	*Ephedra trifurca* *Opuntia*	4	19

	Forb		Annual Production in Pounds Per Acre	
12	desert holly woolly indian wheat	*Acourtia nana* *Plantago patagonica*	4	12
13	tansymustard spectacle pod filaree buckwheat spurge bladderpod	*Descurrinia sophia* Dimorphocarpa wislizeni *Erodium cicutarium* *Eriogonum* *Euphorbia* *Lesquerella*	4	12
14	blanketflower woolly paperflower globemallow	*Gaillardia pulchella* *Psilostrophe tagetina* *Sphaeralcea*	12	19
15	Forb, annual		4	19
	Forb, perennial		4	19

Plant Growth Curve:
Growth Curve Number: NM2503
Growth Curve Name: HCPC
Growth Curve Description: SD-2 Deep Sand HCPC Warm Season Plant Community

Percent Production by Month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	10	10	25	30	15	5	0	0

Transition to broom dalea-sand sage state (1a): The causes of the transition from to the broom dalea/sand sage state are unknown. Given the wide amplitude of conditions across which dropseed communities are believed to be recoverable, it seems possible that shrubs may exert a strong competitive influence over the system once they establish in high densities. Changes in the seasonality of precipitation may be important.

Key indicators of approach to transition: Decreases in dropseeds may be a necessary prerequisite for this transition but it is not sufficient to indicate it.

Transition to mesquite dune state (2a): The causes of the transition to domination by mesquite are unknown. Heavy grazing or destruction of plants by trampling or vehicles with consequent erosion from around mesquite and loss of soil fertility in shrub interspaces is one possible mechanism. Autogenic (mesquite-caused) degradation of soils may also play a role.

Key indicators of approach to transition Decreases in dropseeds and other shrubs may be a necessary prerequisite for this transition but it is not sufficient to indicate it. Changes in the seasonality of precipitation may be important.

Additional States:

Broom-dalea-sand sage: Dropseed abundance is normally variable across years as these grasses are drought sensitive, but if seeds are depleted, or due to the persistent effects of soil degradation or to the effects of herbivory by small animals (see Sandy model), the average abundance of dropseeds at a site has declined. This may be coincident with abundant cover of broom dalea and sand sage, as well as other shrubs including mesquite and little-leaf sumac (*Rhus microphylla*). In some areas, broom dalea and other shrubs are extremely dominant and this appears to be persistent. For example, these communities have been observed on the Fort Bliss, which has been ungrazed for over 50 years. The causes of broom dalea or sand sage dominance are not understood. A persistent broom dalea state may be associated with a petrocalcic horizon underlying the soil at a depth of 100-150 cm (David Trujillo, NRCS, personal communication).

Diagnosis: Dropseed cover is sparse and patchy to absent. Bare ground cover may be low due to the high cover of shrubs.

Transition to dropseed-dominated state (1b): Seeding and/or shrub removal with herbicides. In many cases, dropseed cover recovers only partially and temporarily, and shrubs may recover.

Transition to mesquite dune state (3a): Causes are unknown. Mesquite invasion of the broom dalea-sand sage state is possible.

Mesquite dune: In many areas, only a few species of shrubs may dominate, shrub and grass cover is sparse, and mesquite may form coppice dunes. Where gravel content is high (e.g., >5%), creosotebush (*Larrea tridentata*) may also be present. In some cases, mesquite may be extremely dominant and few other shrubs are present. On sandhills, little-leaf sumac may attain extreme dominance instead of mesquite. Dynamics within this state may occur and be attributable to climate or grazing-associated disturbances (e.g. trampling of shrubs) or to off-road vehicle

activity. In general, wind and water erosion rates appear to be high in this state due to the low plant cover, and this likely maintains very low soil fertility. The conditions under which mesquite attains dominance are not understood.

Diagnosis: Dropseed cover sparse to absent. Bare ground patches are large, forming blowouts and "streets" (i.e. elongated patches in the direction of prevailing winds). Evidence of interdune erosion (pedestalling, blowouts) are present.

Transition to dropseed-dominated state (2b): Possibly with seeding and/or shrub removal with herbicides. Soil stabilization and fertility amendments would probably be needed; this has not been attempted.

Transition to broom dalea-sand sage state (3b): Strategy unknown.

Information sources and theoretical background: Communities, states, and transitions are based upon information in the ecological site description and observations by Jim Powell, NRCS (retired

Ecological Site Interpretations

Animal Community:

This site provides habitat which supports a resident animal community that is characterized by pronghorn antelope, badger, kit fox, spotted ground squirrel, desert pocket mouse, Ord kangaroo rat, southern plains woodrat, scaled quail, pyrrhuloxia, roadrunner, burrowing owl, desert horned lizard, and Couch's spadefoot toad.

Where large mesquite and yucca ar4e present on this site, white necked raven and mourning dove nest. When site deterioration produces a dune-interdune aspect with mesquite invasion, animal population densities shift in favor of burrowing mammals, their predators and shrub-dependent birds.

Hydrology Functions:

The runoff curve numbers are determined by field investigations using hydraulic cover conditions and hydrologic soil groups.

Hydrologic Interpretations	
Soil Series	Hydrologic Group
Bluepoint	A
Pintura	A
Yturbide	A

Recreational Uses:

Suitability for camping and picnicking is fair, and hunting is fair for pronghorn antelope, quail, dove, small game, and waterfowl where seasonal open water occurs. Photography and bird watching for numerous birds, raptors and others can be fair to good, especially during migration seasons. Most small animals of the site are nocturnal and secretive, seen only at night, early morning or evening. Scenic beauty is greatest during spring and sometimes summer months when flowering of forbs, shrubs, and cacti occurs.

Wood Products:

The site has no significant value for wood products.

Other Products:

This site at its potential is suitable for grazing in all seasons of the year. Green forage in the form of forbs and a few early season grasses are occasionally produced in significant amounts in the spring. The dominant production comes in the summer. The site is suitable for use by all classes of livestock. Site deterioration caused by inadequate grazing management is characterized by a decrease or disappearance of black grama and bush muhly, an increase in sand sagebrush and broom delea, mesquite invasion, and eventual dunning or hummocking. The dropseeds may also decrease, coming and going with good and bad years but unable to hold a consistent footing even in normal years. Site recovery can be reasonably rapid following mesquite control coupled with good grazing management. Given adequate opportunity, secondary succession will take place, usually by fourwing saltbush replacing the mesquite, and after several years a gradual re-establishment of the dropseeds and other plants more typical of the natural potential for the site.

Other Information:

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index	Ac/AUM
100 - 76	5.0 – 5.9
75 – 51	5.6 – 7.1
50 – 26	6.8 – 16.0
25 – 0	16.0 - +

Plant Preference by Animal Kind:

	Code	Species Preference	Code
Stems	S	None Selected	N/S
Leaves	L	Preferred	P
Flowers	F	Desirable	D
Fruit/Seeds	F/S	Undesirable	U
Entire Plant	EP	Not Consumed	NC
Underground Parts	UP	Emergency	E
		Toxic	T

Animal Kind: Livestock

Animal Type: Cattle

Common Name	Scientific Name	Plant Part	Forage Preferences											
			J	F	M	A	M	J	J	A	S	O	N	D
black grama	Bouteloua eriopoda	EP	P	P	P	D	D	D	D	D	D	D	P	P
bush muhly	Muhlenbergia porteri	EP	P	P	P	P	P	P	P	P	P	P	P	P
plains bristlegrass	Setaria vulpiseta	EP	D	D	D	D	D	P	P	P	P	D	D	D
sand dropseed	*Sporobolus cryptandrus*	EP	U	U	U	D	D	D	D	D	D	U	U	U
giant dropseed	*Sporobolus giganteus*	EP	U	U	U	D	D	D	D	D	D	U	U	U
spike dropseed	*Sporobolus contractus*	EP	U	U	U	D	D	D	D	D	D	U	U	U
mesa dropseed	*Sporobolus flexuosus*	EP	U	U	U	D	D	D	D	D	D	U	U	U
sand sagebrush	Artemisia filifolia	L	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
fourwing saltbush	Atriplex canescens	EP	P	P	P	P	P	D	D	D	D	D	P	P

Supporting Information

Associated Sites:

Site Name	Site ID	Site Narrative
Sandy	R042XB012NM	
Gravelly	R042XB010NM	

Similiar Sites:

Site Name	Site ID	Site Narrative
Sandy	R042XB012NM	
Gravelly	R042XB010NM	

State Correlation:
This site has been correlated with the following states: Texas

Inventory Data References:

Data Source	Number of Records	Sample Period	State	County

Type Locality:

Other References:
Data collection for this site was done in conjunction with the progressive soil surveys within the Southern Desertic Basins, Plains and Mountains, Major Land Resource Areas of New Mexico. This site has been mapped and correlated with soils in the following soil surveys. Sierra County Dona Ana County Grant County Hidalgo County Luna County Otero County

Characteristic Soils Are:	
Blurepoint loamy fine sand	
Pintura loamy fine sand	
Yturbide loamy sand	
Other Soils included are:	
Wink loamy fine sand, more than 5"surface	
Hucco loamy fine sand, more than 5"surface	
Yturbide gravelly sand	

Site Description Approval:

Author	Date	Approval	Date
Don Sylvester	07/12/1979	Don Sylvester	07/12/1979

Site Description Revision:

Author	Date	Approval	Date
Dr. Brandon Bestelmeyer	05/22/02	George Chavez	05/23/02
George Chavez	05/22/02		